TEACHING MODULES INFORMATION
EMJMD WACOMA (academic year 2018/19)

1.	**Module Title:** General methodology to assess quality of coastal ecosystems.
2.	**Module Code:** (not necessary yet)
3.	**Maximum Number of Students:** 16
4.	**Total ECTS Credits:** 2 ECTS
5.	**Month: April-June** First Year-Second Semester
6.	**Notional Learning Hours (Please fill a number in box)**: **(a) Contact Time - e.g in the classroom, or fieldwork** **(b) Private Study - reading time, preparing and taking assessments** **Format of Teaching:** Lectures 6 Hours (a) Laboratory……..…..8 Hours (a) Other (Private study)……..……36 Hours (b) **Teaching Strategy:** This theoretical input of this module establishes the basis for the correct design, development and application of the different techniques (toxicity tests, determination of lethal or sublethal responses, determination of the integrity of the ecosystem, etc.) to assess toxicity of anthropogenic sources of contamination. The module is developed mainly in the laboratory, where the students design and learn a complete experimental study for the evaluation of the environmental quality of coastal systems. These are practices that are performed in the laboratory will be conducted in sessions with time limitation. It is considered opportune that the practical classes are carried out with a maximum number of 16 students per session and grouped in pairs, so as to enhance teamwork and the exchange of ideas.
7.	**Convener:** M. Laura Martín / Marta Sendra
8.	**Institution:** University of Cadiz / CSIC
9.	**Level (Please tick Y):** Master degree
10.	**Language(s) of Tuition**: English
11.	**Pre-requisites:** • Not special requirements are need except some background in lethal and sublethal toxicity. • Recommendable to have some experience dealing with environmental risk assessment regulation framework. .

12.	**Co-requisites:** None
13.	**Programme(s) for which module is core:** **Erasmus Mundus Joint Master Degree in Water and Coastal Management (WACOMA)**
14.	**Module Description - The Purpose or Aims:** Large quantities amount of micropollutants are continually entering estuaries, coastal marine, and freshwater environments. Additionally, human activities have increased the influx of many naturally occurring chemicals, such as metals, naturally- occurring radioactive materials, and petroleum hydrocarbons, to marine and freshwater areas. Besides, many, industrial, domestic and agricultural activities are the sole sources of an ever-increasing number of synthetic organic chemicals in the ocean, particularly pesticides andincluding the pharmaceuticals, that are entering. the ocean. The toxic effect on flora and fauna is related to the bioavailability of these pollutants. Bioavailable chemicals can accumulate to high, potentially toxic concentrations and produce reversible and irreversible effects in the various different exposed organisms that are exposed to such chemicals. The monitoring of pollutants in the environment includes parameters such specific activities as monitoring biological effect (using biomarkers of exposure) and monitoring health and behaviour (using biomarkers of effect, avoiding experiments).
15.	**Learning Outcomes:** After completing this module the student should be able to determine sublethal toxicity of anthropogenic sources of contamination and to apply monitoring tools in risk assessment.
16.	**Summary of Course Content:** 1. Techniques for measurement of Neutral Red Retention Time in mussels as biomarker of exposure. 2. Techniques for measurement of enzymatic activities as biomarkers of exposure. 4. Techniques for measurement of biomarkers of effect. 5. Techniques in Cytotoxity.
17.	**Key Skills Taught:** Ecotoxicology. Environmental Risk Assessment.
18.	**Assessment Methods:** Students will have to calculate the risk of different substances taking into consideration the results obtained in the Laboratory. They will have to discuss the environmental implications of obtained results for environmental regulatory framework Students will have to present the assessment in a written format.

19.	**Assessment Criteria:** A successful candidate should have or be able to do the following: ***Threshold*** A basic understanding of the appropriate science and modelling approach and a reasonable understanding of the model results and their implications. ***Good*** A good understanding of the science and correct model results which are presented and interpreted to a good standard, with some reference to independent literature data and results. ***Excellent*** A good to excellent understanding of the science and correct model results which are presented and interpreted to a high standard, with plenty of references used for comparisons and to critically evaluate the results.
20.	**Resource Implications of Proposal and Proposed Solutions:** *(Recommended Bibliography: compulsory, optional, other sources of information)* - Aguirre-Martinez GV, Buratti S, Fabbri E, DelValls TA, Martin-Diaz ML. 2013a. Using lysosomal membrane stability of haemocytes in Ruditapes philippinarum as a biomarker of cellular stress to assess contamination by caffeine, ibuprofen, carbamazepine and novobiocin. J Environ Sci China 25: 1408-1418. - Blanchette B, Feng X, Singh B.R. 2007. Marine glutathione S-transferases. Mar Biotechnol 9: 513–542. - Bolognesi C, Rabboni R, Roggieri I. 1996. Genotoxicity biomarkers in M. Galloprovincialis as indicators of Marine Pollutants. Comp Biochem Phys C 2: 319-323. - Burke MD, Mayer RT.1974. Ethoxyresorufin: direct fluorometric assay of a microsomal O-dealkylation which is preferentially inducible by 3 methylcholanthrene. Drug Metab Dispos 2: 583-58. - Haugland, R. P. (2002). Handbook of fluorescent probes and research products. Molecular Probes. - Lee, J. A., Spidlen, J., Boyce, K., Cai, J., Crosbie, N., Dalphin, M., & Hyun, B. (2008). MIFlowCyt: the minimum information about a Flow Cytometry Experiment. Cytometry Part A, 73(10), 926-930. - Olive PL, Chan APS, British CSC. 1988. Comparison between the DNA Precipitation and Alkali Unwinding Assays for Detecting DNA Strand Breaks and Cross-Links. Can Res 48: 6444-6449 - Shapiro, H. M. (2005). Practical flow cytometry. John Wiley & Sons. **Specific Resource Implications for Students**: Internet access to Science Direct is recommended.
21.	**Does this module replace existing provision? If so, please indicate modules to be replaced:** The module fits in the area of "Ecotoxicological Evaluation of Risk in Water and Coastal Management"
22.	**Start Date:** April, First Year, Second Semester
23.	**Is it intended that the module be available every year?** Yes